

HIGH-PRESSURE FLUID-JET CUTTING DEVICE AND METHOD WITH
ABRASIVE REMOVAL SYSTEM

ABSTRACT OF THE DISCLOSURE

A fluid jet-cutting machine with an abrasive particle removal device and method. In one embodiment, the fluid-jet cutting machine has a nozzle and a carrier assembly attached to the nozzle to move the nozzle along a cutting path. A high-pressure fluid source and an abrasive particle source are coupled to the nozzle to generate an abrasive fluid-jet having a fluid and a plurality of abrasive particles for cutting a work-piece. The cutting machine also has a particle removal device including a tank aligned with the nozzle, a settling container, and a fluid transport mechanism to transport fluid from the tank to the settling container. The tank includes at least one compartment configured to receive the fluid and the abrasive particles of the fluid-jet along at least a portion of the cutting path. Additionally, the compartment is configured to control fluid flow within the compartment so that the fluid-jet suspends, and maintains the suspension, of at least a substantial portion of the abrasive particles in the one compartment without additional mechanical agitation. The fluid transport mechanism can include a conduit with a first end in fluid communication with the compartment and a second end outside of the compartment in fluid communication with the settling container. In operation, a portion of the fluid with suspended abrasive particles in the compartment is transported through the conduit and into the settling container. The abrasive particles from the transported portion of fluid settle to a lower portion of the settling container while a clarified fluid is removed from the settling container.